

**What Is Claimed Is:**

- 1        1.    A delta-phase detection method for identifying a  
2 burst sequence in a received signal, comprising the steps of:  
3        calculating phase differences of every two consecutive  
4        samples in the received signal;  
5        detecting the burst sequence and locating the end of the  
6        burst sequence by comparing each of the phase  
7        differences with an upper threshold and a lower  
8        threshold; and  
9        estimating a burst frequency of the burst sequence once  
10       detecting the burst sequence.
- 1        2.    The method according to claim 1, further comprising  
2 the steps of:  
3        band-pass filtering the received signal to eliminate noise  
4        before calculating the phase differences; and  
5        low-pass filtering the phase differences to smooth  
6        variations of the phase differences.
- 1        3.    The method according to claim 1, wherein detecting the  
2 burst sequence and locating the end of the burst sequence further  
3 comprises:  
4        providing a factor indicating a maximum fluctuation for the  
5        phase differences;  
6        determining the upper threshold and the lower threshold of  
7        an allowable detecting range according to the factor;  
8        comparing each of the phase differences with the upper  
9        threshold and the lower threshold;

10 counting a number of successive phase differences within  
11 the allowable detecting range, and storing the number  
12 in a counter;  
13 providing a valid counting range according to an expected  
14 duration of the burst sequence;  
15 comparing the counter with the valid counting range; and  
16 locating the end of the burst sequence when the counter is  
17 within the valid counting range.

1 4. The method according to claim 1, wherein estimating  
2 the burst frequency includes using a linear equation to  
3 calculate the frequency of the burst sequence from the upper  
4 threshold and the lower threshold.

1 5. The method according to claim 4, wherein the linear  
2 equation for estimating the burst frequency is averaging the  
3 upper threshold (A) and the lower threshold (B), and multiplying  
4 a sampling frequency ( $f_s$ ) over two times a ratio of the  
5 circumference of a circle to its diameter ( $f = \frac{(A+B) * f_s}{4\pi}$ ).

1 6. The method according to claim 1, further comprising  
2 adjusting an output frequency of a local oscillator according  
3 to the burst frequency, thereby maintaining frequency  
4 synchronization.

1 7. A signal processor for identifying a burst sequence  
2 in a received signal, comprising:  
3 means for calculating phase differences of every two  
4 consecutive samples in the received signal;

5 means for detecting the burst sequence and locating the end  
6 of the burst sequence by comparing each of the phase  
7 differences with an upper threshold and a lower  
8 threshold; and  
9 means for estimating a burst frequency of the burst  
10 sequence once detecting the burst sequence.

1 8. The signal processor according to claim 7 further  
2 comprising:

3 means for band-pass filtering the received signal to  
4 eliminate noise before calculating the phase  
5 differences; and  
6 means for low-pass filtering the phase differences to  
7 smooth variations of the phase differences.

1 9. The signal processor according to claim 7, the means for  
2 detecting the burst sequence and locating the end of the burst  
3 sequence performs the steps of:  
4 providing a factor indicating a maximum fluctuation for the  
5 phase differences;  
6 determining the upper threshold and the lower threshold of  
7 an allowable detecting range according to the factor;  
8 comparing each of the phase differences with the upper  
9 threshold and the lower threshold;  
10 counting a number of successive phase differences within  
11 the allowable detecting range, and storing the number  
12 in a counter;  
13 providing a valid counting range according to an expected  
14 duration of the burst sequence;  
15 comparing the counter with the valid counting range; and

16        locating the end of the burst sequence when the counter is  
17                within the valid counting range.

1        10. The signal processor according to claim 7 further  
2        comprising means for adjusting an output frequency of a local  
3        oscillator according to the burst frequency.

1        11. A delta-phase detection system for identifying a  
2        burst sequence in a received signal, comprising:  
3        a band pass filter, receiving and filtering the received  
4                signal to eliminate noise;  
5        a delta-phase calculator, coupling to the band pass filter  
6                and calculating phase differences of every two  
7                consecutive samples in the received signal;  
8        a low pass filter, smoothing variations of the phase  
9                differences calculated by the delta-phase  
10               calculator; and  
11        a flat line detector, detecting the burst sequence and  
12               locating the end of the burst sequence by comparing  
13               each of the phase differences received from the low  
14               pass filter with an upper threshold and a lower  
15               threshold.

1        12. The system according to claim 10, wherein the flat line  
2        detector comprising a frequency estimator, which calculates a  
3        burst frequency of the burst sequence from the upper threshold  
4        and the lower threshold of the phase differences.

1        13. A method for maintaining synchronization between a  
2        mobile radio station having a local oscillator oscillating at  
3        a local oscillating frequency, and a base station by identifying

4 a burst sequence in a received signal received by the mobile  
5 radio station, comprising the steps of:

6 determining the frequency of the burst sequence by a  
7 delta-phase detecting method, wherein the  
8 delta-phase detecting method comprising:

9 (a) calculating phase differences of every two  
10 consecutive samples in the received signal;

11 (b) detecting the burst sequence and locating the end  
12 of the burst sequence by comparing each of the phase  
13 differences with an upper threshold and a lower  
14 threshold; and

15 (c) estimating a burst frequency of the burst sequence  
16 once detecting the burst sequence;

17 adjusting the local oscillating frequency of the local  
18 oscillator according to the frequency of the burst  
19 sequence to maintain the synchronization.

1 14. The method according to claim 13, wherein the  
2 delta-phase detecting method further comprises the steps of:

3 (d) band-pass filtering the received signal to eliminate  
4 noise before calculating the phase differences; and

5 (e) low-pass filtering the phase differences to smooth  
6 variations of the phase differences.

1 15. The method according to claim 13, wherein detecting  
2 the burst sequence and locating the end of the burst sequence  
3 further comprises:

4 (f) providing a factor indicating a maximum fluctuation for  
5 the phase differences;

6 (g) determining the upper threshold and the lower threshold  
7 of an allowable detecting range according to the  
8 factor;  
9 (h) comparing each of the phase differences with the upper  
10 threshold and the lower threshold;  
11 (i) counting a number of successive phase differences  
12 within the allowable detecting range, and storing the  
13 number in a counter;  
14 (j) providing a valid counting range according to an  
15 expected duration of the burst sequence;  
16 (k) comparing the counter with the valid counting range;  
17 and  
18 (l) locating the end of the burst sequence when the counter  
19 is within the valid counting range.

1 16. The method according to claim 13, wherein estimating  
2 the burst frequency includes using a linear equation to  
3 calculate the frequency of the burst sequence from the upper  
4 threshold and the lower threshold.

1 17. The method according to claim 16, wherein the linear  
2 equation for estimating the burst frequency is averaging the  
3 upper threshold (A) and the lower threshold (B), and multiplying  
4 a sampling frequency ( $f_s$ ) over two times a ratio of the  
5 circumference of a circle to its diameter ( $f = \frac{(A+B) * f_s}{4\pi}$ ).